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GOVERNMENT RESEARCH WORKS HARD TO IMPROVE COTTON PRODUCTS

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Scientists at the U. S. Department of Agriculture's Southern Regional Research Laboratory in New Orleans, La., are demonstrating the possibilities of research as a medium to help cotton maintain its present dominant position in the textile field. Although cotton is used more than all other textile fibers combined, adequate attention to research is needed if cotton is to expand or maintain its markets.

For a long time cotton's competition came from other natural fibers and from materials such as wood and leather which did not seriously threaten its position. But during recent years other products have made serious inroads into cotton's end uses. Rayon--the first successful man-made fiber--has been in continuous production in the United States since 1911 and has been improved so much through research within the last 15 years that it is now competing for a large segment of cotton's market.

Cotton is naturally endowed with superiority in a large number of useful properties. Such qualities as resiliency, elasticity, and rot resistance, however, are not as prominent in cotton as in some other fibers and one of the objects of research on cotton is to improve these qualities by new finishing techniques. A brief discussion of a few typical projects at the Southern Regional Research Laboratory will serve to illustrate the progress that is being made along these lines.

One of the quality elements in which cotton is lacking is resistance to attack by mildew and bacterial rot. Treatments with various copper compounds have been found effective in increasing this resistance but such compounds are gradually removed by leaching with water. Rotproofing by the process of partial acetylation has been extensively investigated at the laboratory. The cotton cellulose is partially converted into a new compound, cellulose acetate, without changing the form or appearance of the fiber. The modified, or partially acetylated, cotton becomes unpalatable to bacteria, without becoming discolored, odorous, sticky, or toxic.

Experimental quantities of acetylated cotton cloth are being produced in the pilot plant of the Laboratory with commercial-type machinery for the purpose of supplying interested industrial firms with enough cloth for adequate service trials.

The laminated plastics industry is also showing interest in acetylated cotton because of the improved electric insulation qualities.

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More Effective Weatherproofing

With the objective of improving protective treatments of cotton textiles for out-of-door service, the influence of weather on cotton fabrics is being studied. Both plain and chemically finished samples are under test in outdoor exposure, the chemically finished group including representative pigment, resin, and other protective treatments. In general the chemical treatments developed for protecting cotton against mildew attack have been found ineffective in protecting against deterioration by weather.

Another weathering test at the Laboratory is concerned with gauging the destructive effect of each component of sunlight on treated and untreated cotton.

Results show that sunlight, in the absence of mildew or acid fumes, is responsible for at least 95 per cent of weather degradation of cotton fabrics.

Differential Dyeing
Of Cotton Fibers

In connection with the studies on the use of immature (thin-walled) cotton in the manufacture of water-resistant fabrics, it was found that the thin-walled cotton fibers had different dyeing characteristics from the thick-walled fibers. When a sample of raw cotton is dyed in a bath containing a mixture of a specially selected direct red dyestuff and a specially selected direct green dyestuff, the mature (thick-walled) fibers will dye red and the immature (thin-walled) fibers will dye green. So far as is known, this is the first example of cross-dyeing untreated cottons two colors in the same bath.

The differential dyeing technique provides a new method for the estimation of maturity in cotton, and is one which can easily be applied in the laboratories or dye houses of textile mills. The method is promising enough so that several cotton manufacturing plants are applying it in their selection of cottons for purchase.

Microscopy in Cotton Finishing Research

An important phase of the investigations at the laboratory on the chemical treatments of cotton to improve its qualities is the microscopic study of individual fibers. Skilled fiber technologists assess the effects of experimental finishing treatments through examinations at high magnifications of specially prepared cross sections of the treated and untreated fibers. Photomicrographs record the changes which have taken place. This microscopic technique has proven very useful in studying (1) the penetration of rubber latex dispersions into cotton tire cord, and (2) the penetration of resins designed to improve the crease resistance of cotton fabrics.

In the past, the bulk of the domestic cotton crop has consisted of short-staple cotton, of which a considerable portion has gone into industrial fabrics receiving little, if any, chemical finishing treatment. The uses for these low-grade products have been sufficiently restricted so that surpluses of the short-staple cotton were accumulated. Such low-grade fabrics as part-waste osnaburg

and bag sheeting have been finished at the laboratory on a semi-commercial scale by standard methods that include kier boiling, bleaching, mercerizing, and dyeing with fast vat colors. These fabrics, originally limited to bagging and similar low-cost outlets, are thus converted into quality products suitable for garments, draperies, slip covers, etc. At the present time, there is no surplus of short-staple cotton. With the return of the cotton market to more normal conditions, it is anticipated that the above finishing techniques may help to prevent such surpluses from recurring.